
V. *Experiments concerning the Effects of Air paſs'd through red hot Mettals, &c. By Mr* F. Hauksbee, *F. R. S.*

IN order to find what Effect ſuch a *Medium*, as Air paſſed thro' red hot Mettals, might have on the Lives of Animals, I contrived the following Method. I took a large Receiver open at top, in Diameter about 4 Inches, which was covered with a Braſs Plate and wet Leather, as uſual in Glaſſes of ſuch a make. To this Plate at top (which had a Screw with a ſmall Perforation) belonged a Cock, and from that Cock proceeded a ſmall hollow Wire, about 3 feet in length: That End of this hollow Wire, which was remote from the Receiver, was put into a hollow Piece of Caſt Braſs, pretty thick in ſubſtance, but the Hole was not quite through: And the Hole being larger than the ſmall hollow Wire, it was wedg'd into the ſame with Pieces of Steel Wire, till the Caſt Braſs was fill'd as full as it could contain. In this manner it was put into a Charcoal Fire, and there it lay till it was throughly red hot. The Receiver being then exhauſted of its Air, the Cock on the upper part of it was turn'd, which gave liberty for that Air only, which of neceſſity muſt paſs thro' the red hot Mettals, to ſucceed. This Air firſt paſſing down thro' the ſmall Ducts between the red hot Wires, before it could come to enter the red hot hollow Braſs Wire, muſt of neceſſity ſuffer or undergo ſuch a Change, as Fire or the Fumes of ſuch red hot Mettals would give it. When the Receiver was fill'd with this Air, and had ſtood ſome little time, the Braſs Cover was taken off, and a pretty large Cat immediately plung'd into it: The Cover being laid on again, the Cat immediately fell into Convulſions, and in leſs than a Minute appeared without any ſign of Life. Then being taken out of the Receiver and laid on the Floor, ſhe continued as Dead; but in leſs that a Minute of time ſhe began to diſcover Life by motion in her Eyes, and after 2 or 3 hideous Squalls, ſhe began to recover apace; but was very fierce, and did ſpit and fly (as well as her Weakneſs would ſuffer her) at any one that offer'd to touch her; and it ſeem'd hazardous for any one then to attempt it. But after half an hours time, or thereabouts, as her Strength and Eaſe recovered, ſo her former Temper encreaſed upon her, ſuffering herſelf to be handled without any ſign of fierceneſs, as before.

As to the Effect, which the ſame ſort of Factitious Air has upon Flame, take as follows.

I no ſooner came to plunge a lighted Candle into it, but it was immediately extinguiſh'd: And this I ſeveral times obſerv'd, that when the Candle was ſlowly immers'd, ſo much of the Wick (which before was lighted) as came but within the verge of the Glaſs, died; and ſo the reſt ſucceſſively, as it deſcended to the ſame place: And this upon ſeveral repetitions, anſwer'd much the ſame. But in ſome time, as the common Air came to mix with it, one might plunge the lighted Candle lower and lower, before it did go out, till at laſt it would remain burning at bottom.

As to the Elaſticity and Specifick Gravity of the foremention'd *Medium*, I have made ſeveral tryals, (and I think very accurate,) but find it no ways differing from Common Air, in reſpect to thoſe Properties.

Hence it follows,

That the foregoing Effect, is no ways aſſiſted from any Imperfection or defect in the laſt mentionod Properties: There-

Therefore the following Queries ſeem to offer themſelves

Query 1. Whether Air itſelf may ſo ſuffer in its own Nature, by any ſort of Fire, as to be diveſted of the Power of ſubſiſting Life or Flame: Or,

Query 2. Whether the *Effluvia*, or Steems, proceeding from the red hot Mettals, which the Air may take along with it in its Paſſage near them, do not very much contribute, if not wholly occaſion the Effect.

If the latter takes place, I preſume it may in ſome meaſure be applied to account for the Effect, that the Damps, or Steems, which ariſe from Subterraneous Caverns, impregnated with Mettaline *Effluvia*, have on the Lives of Animals: And yet at the ſame time, the ſame Air way ſuffer no Change in reſpect to its other Properties, I mean its Elaſticity and Specifick Gravity, in compariſion with other Air in the ſame Region.

Experiments concerning the Effect of Air paſs'd thro' a Degree of Heat, equal to that of boiling Water.

I Contriv'd a Braſs Box, about 4 Inches long, and an Inch and half over: At one end, which I ſoder'd up I fix'd two ſmall Braſs Tubes; one of which went thro', and reach'd the Remoter end nearly; the other Tube was but juſt inſerted in it, but each of them long enough to reach ſufficiently above the Surface of the Water in which they were to be put. Theſe Tubes were to convey the Air into a Receiver exhauſted of its Air: It paſs'd firſt into that Tube which nearly reach'd its oppoſite end, and ſo into the other which lead to the exhauſted Receiver. But the Box, with that part of the Tube that was within it, was firſt preſſed full of Braſs Duſt; which I had the conveniency to do by means of a Braſs Cap, which ſcrew'd on to the end, not before mentioned. This Braſs Duſt I moiſtned with a little Water, thinking thereby to exert a more than ordinary Steam, or *Effluvia*, from the Mettal, which the Air might take along with it, as it paſs'd through ſuch ſtrait and narrow Avenues, as it muſt do between the Braſs Duſt. In this manner it was put into the Water when Cold, and continued in it till it had boil'd a conſiderable time; by which means it muſt, in all its Parts, be of the ſame Degree of Heat (at leaſt) as the boiling Water. Thus it was taken out, and applied to the exhauſted Receiver; where, upon turning a Cock, I gave the liberty for that Air only to paſs into it, which muſt ſucceed through the Braſs Box and Duſt, under the Circumſtances before mentioned. When the Receiver was full of this Air, the Cover was taken off, and a lighted Candle plung'd into it, where it continued burning, even at the bottom, as if it had paſs'd through no ſuch *Medium*, but had been full of Common Air. I took that Method to try it, believing the Flame of a Candle to be the moſt tender way of diſcovering a Change in Air. Afterwards I repeated the ſame Experiment over again, with dry Braſs Duſt inſtead of the former; but the Succeſs was the ſame. Therefore it ſeems to me, that ſuch a Degree of Heat, as that of boiling Water, is not ſufficient to cauſe any conſiderable Change (if any at all) in the Air; nor ſuch a Degree of Heat, able to ſtrike any Injurious, or ſuffocating *Effluvia*, out of the Metalline Particles.

Some other Experiments on the foregoing Head.

THE paſſing of Air through a red hot Glaſs Tube into an exhauſted Receiver, had no manner of influence on a Sparrow put into the ſame: But upon paſſing of Air through red hot Charcoal, before it enter'd the Tube that convey'd it into the exhauſted Receiver, the fore-mentioned Animal, in that *Medium* in about a quarter of a Minute, gave ſigns of preſently expiring; but being taken out at the ſame time did recover, and continued living and well for ſome Days after. Yet it was concluded, had the Birds continuance in the Receiver been but double that time, her recovery would have been very doubtful. I have likewiſe try'd Air paſs'd through the Flames of Spirit of Wine, and Oil of Turpentine: The Effect was much the ſame as to the Spirit of Wine, the Flame of a Candle being immediately extinguiſh'd upon its being plung'd into it: But the Air which paſs'd through the Flame of the Oil of Turpentine took ſome Unctious Fumes along with it into the exhauſted Receiver; which Fumes, upon the near approach a lighted Candle, ſuddenly took fire, and continued to burn on the upper Surface, till they were ſtifled by covering cloſe the Receiver: And upon ſeveral Repetitions it anſwer'd much the ſame, till the whole quantity of Fume was conſum'd.